

WHAT IS CLAIMED IS:

1. An optical amplifier, comprising:
 - a gain medium;
 - an input monitor, operable to measure a power of an ingress optical signal and generate an input power signal based on the power;
 - an output monitor, operable to measure a power of an egress optical signal and generate an output power signal based on the power;
 - 10 an automatic gain controller including a feedforward module and a feedback module;
 - the feedforward module operable to receive the input power signal generated by the input monitor and to generate a first control signal based on the input power signal;
 - the feedback module operable to receive the input and output power signals generated by the input and output monitors and to generate a second control signal based on the input and output power signals; and
 - 20 the automatic gain controller operable to control pump energy provided to the gain medium based on the first and second control signals.
2. The optical amplifier of Claim 1, wherein the optical pump is a continuous wave laser.
3. The optical amplifier of Claim 1, wherein the gain medium is erbium doped fiber.
- 30 4. The optical amplifier of Claim 1, wherein the input and output power signals generated by the input monitor and output monitor are electrical signals.

5. The optical amplifier of Claim 1, wherein the first and second control signals generated by the feedforward module and feedback module are electrical
5 signals.

6. The optical amplifier of Claim 1, wherein the first control signal is based on the input power, an aging factor, and the desired gain of the amplifier.

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7. The optical amplifier of Claim 1, wherein the control signal generated by the feedforward module is linearly proportional to the input power signal.

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8. The optical amplifier of Claim 1, wherein the control signal generated by the feedforward module is monotonic to the input power signal.

9. An optical amplifier, comprising:
a pump laser operable to generate pump energy;
a gain medium coupled to the pump laser and operable
to amplify an optical signal with the pump energy to
5 generate an amplified optical signal;
a controller coupled to the pump laser and the gain
medium, the controller operable to control the pump laser
based on feedforward monitoring of the optical signal and
feedback monitoring of the amplified optical signal.

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10. The optical amplifier of Claim 9, the
controller further operable to control the pump laser
based on an aging factor of the pump laser.

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11. The optical amplifier of Claim 9, the
controller further operable to control the pump laser
based on a desired gain of the amplifier.

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12. The method of Claim 9, wherein the optical pump
comprises a continuous wave laser.

13. The method of Claim 9, wherein feedforward
monitoring is based on a linear relationship between the
input power and a pump current of an optical pump.

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14. The method of Claim 9, wherein feedforward
monitoring is based on a monotonic relationship between
the input power and a pump current of an optical pump.

15. The method of Claim 9, wherein feedforward monitoring is based on a linear relationship between the input power and a pump current of a set of optical pumps.

5 16. The method of Claim 9, wherein feedforward monitoring is based on a monotonic relationship between the input power and a pump current of a set of optical pumps.